Ideas to Observations: Tools for the Next Decade

Scientist's Expert Assistant
Simulation Facility

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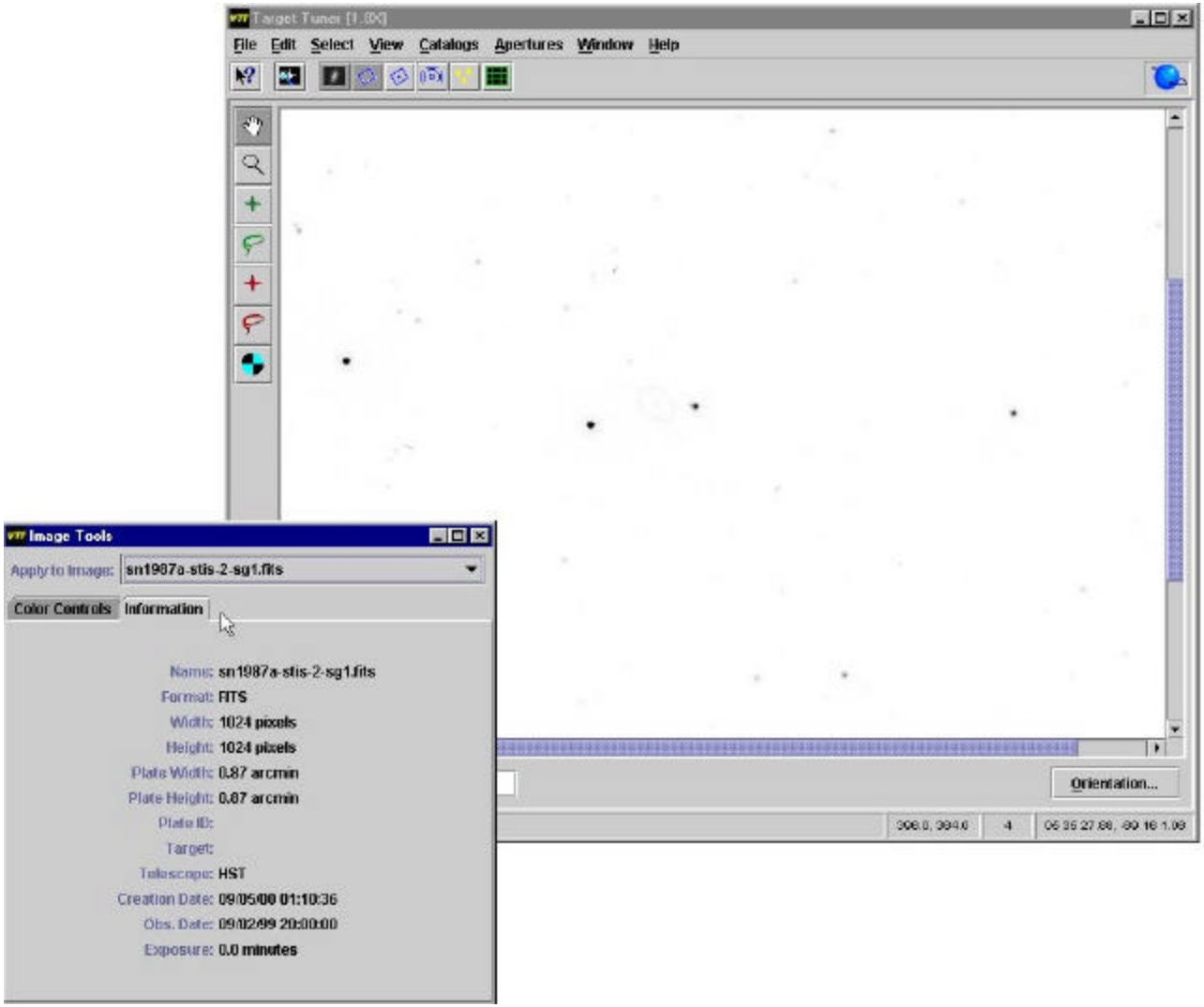
Introduction

- What is the Scientists' Expert Assistant (SEA)?
- What is the SEA Simulation Facility?
- Why the SEA Simulation Facility?
- Current status of the SEA Simulation Facility
- Coming in next 18 months

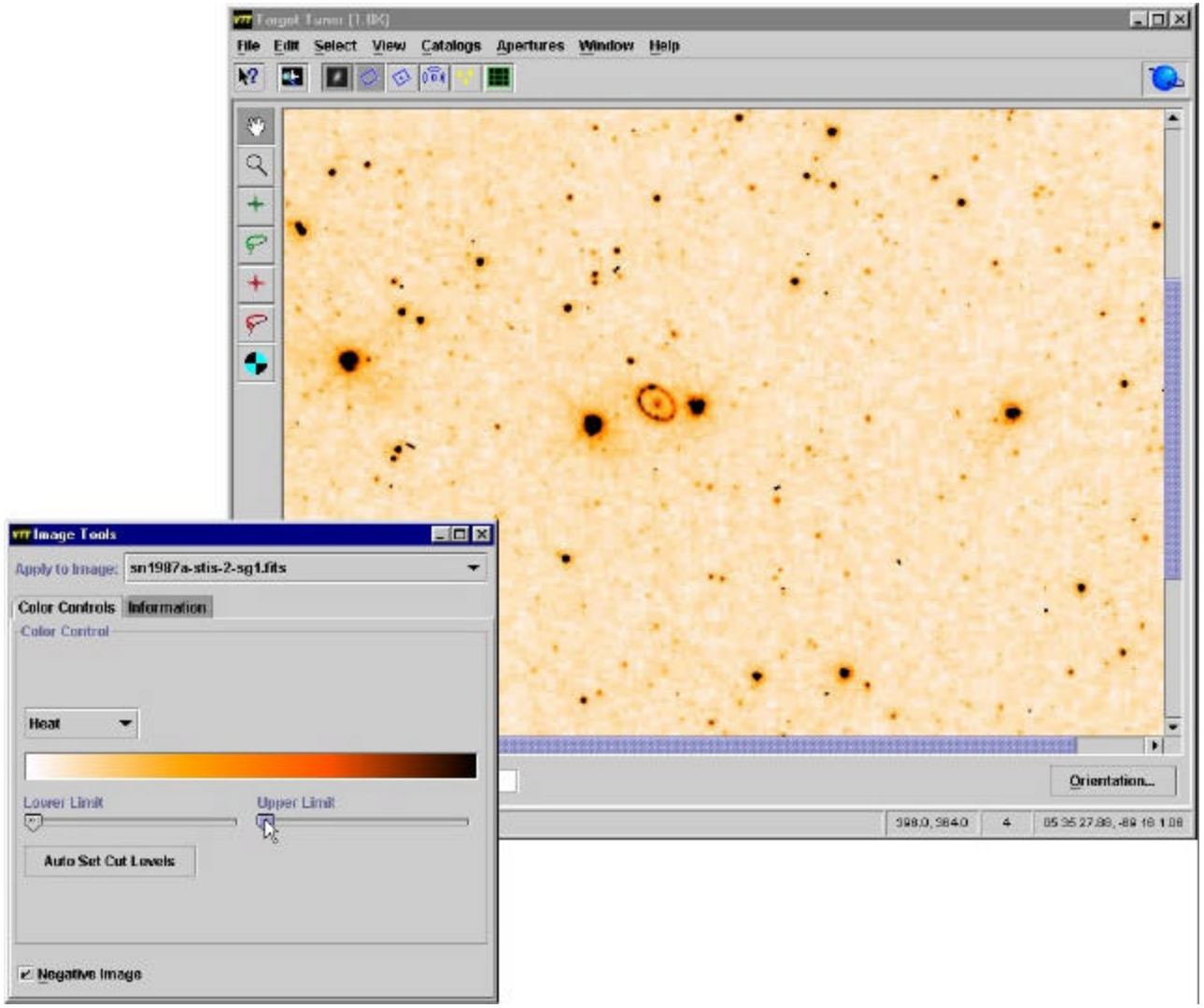
What is the Scientists' Expert Assistant (SEA)?

- Putting the "eye" back into observation planning
  - Software interface to guide scientists in the preparation of their observing proposal
  - Proof of concept for new approaches, reduces risks and costs for follow-on work
  - Initially funded by NGST
  - Adopted by STScI for production use
- Now funded by AISRP and Code 588
  - Expanding to more observatories: SOFIA, SIRTF, ESO, KRONOS
  - Developing simulation facility (SSF)

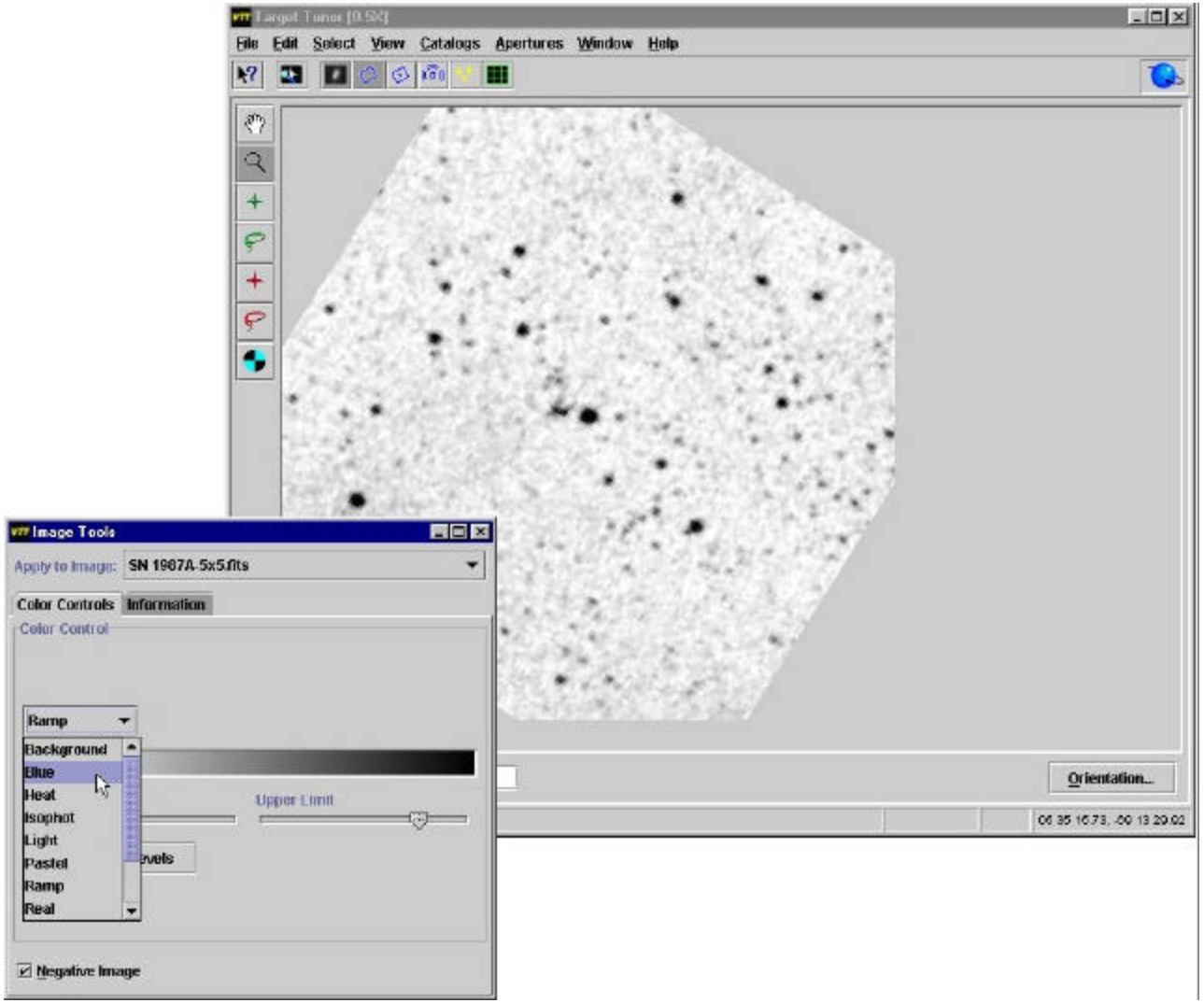
Multiple Images Example 1: SN1987A from STIS



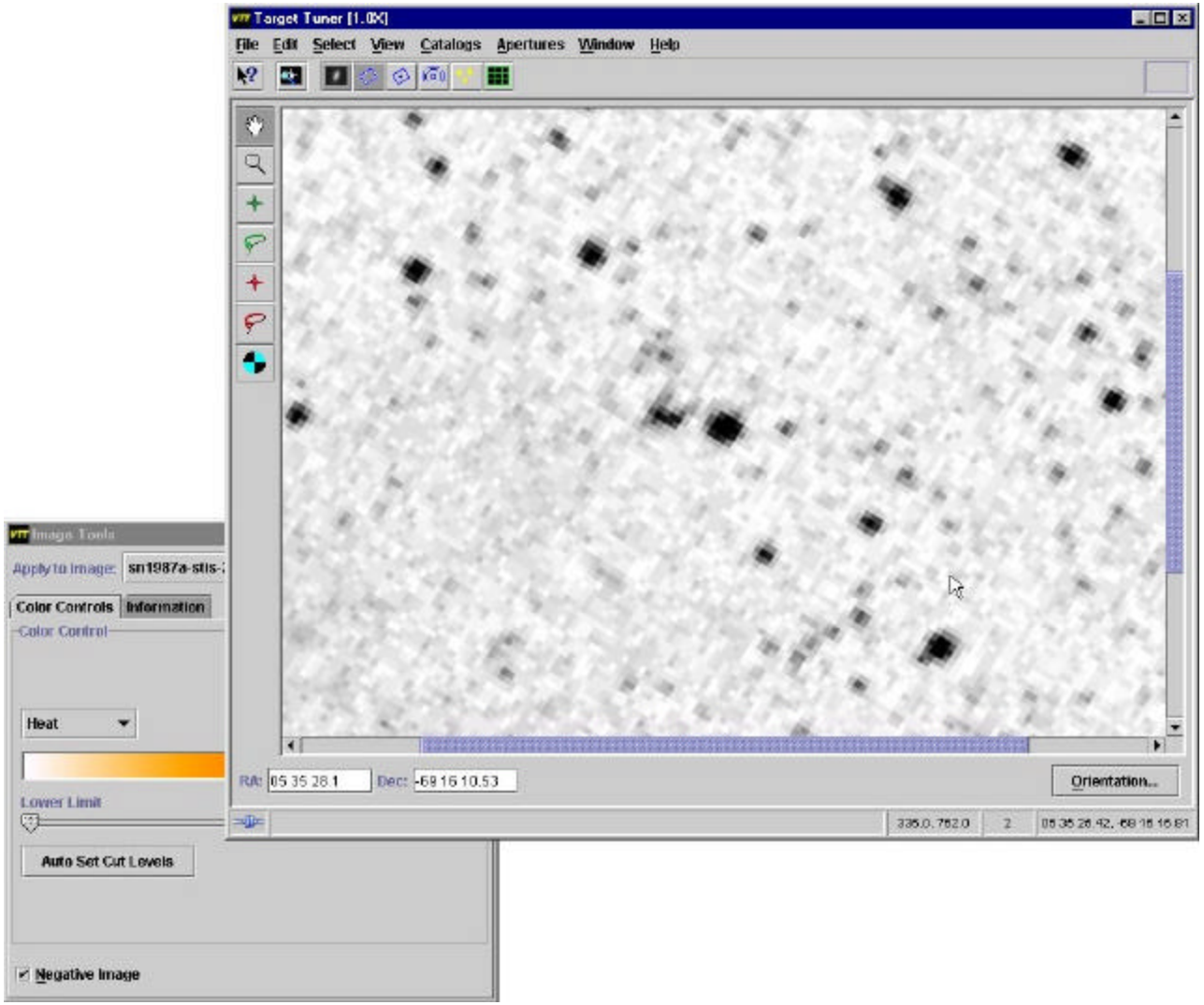
Multiple Images Example 2: Change color/contrast



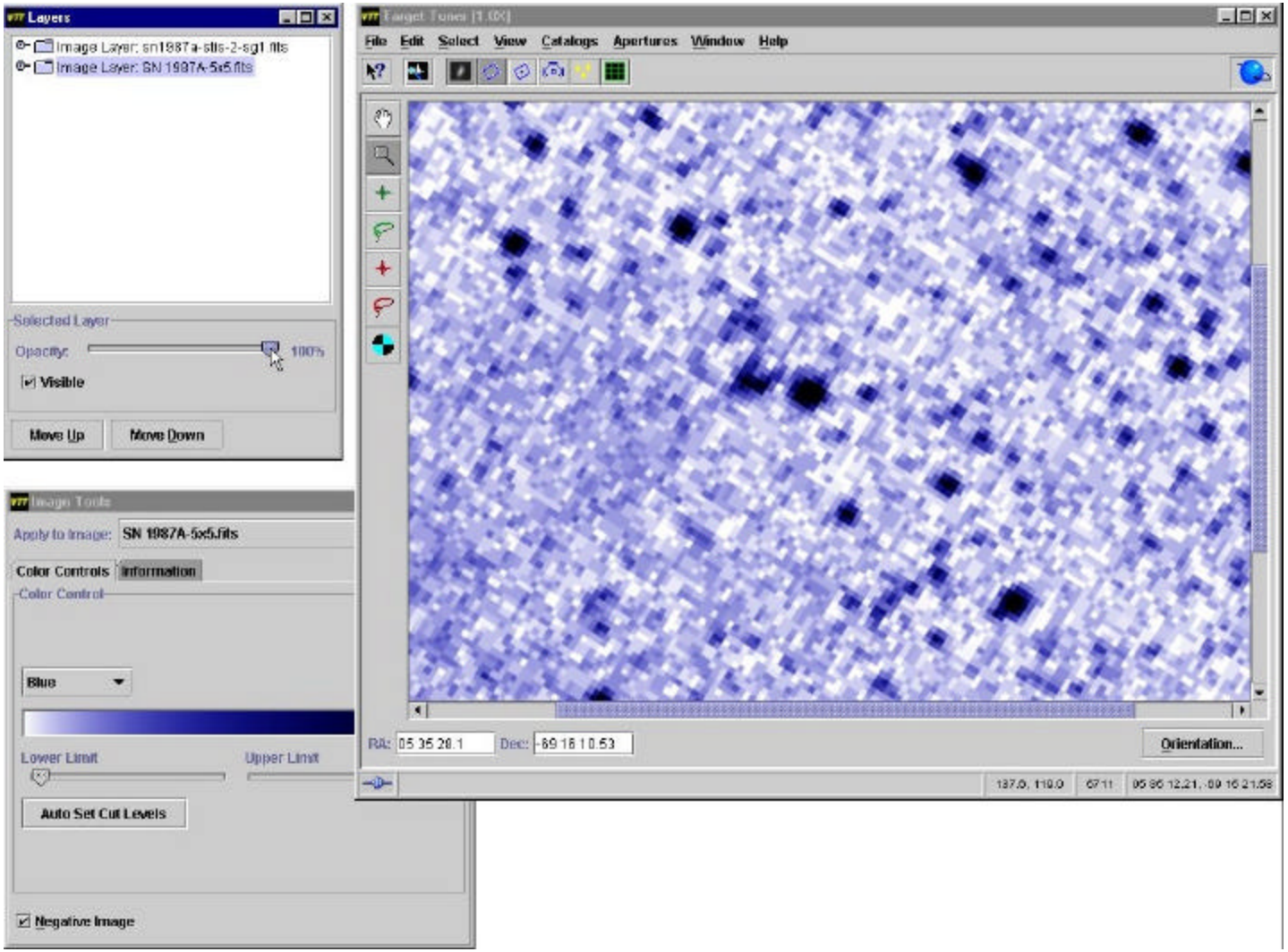
Multiple Images Example 3: SN1987A from DSS



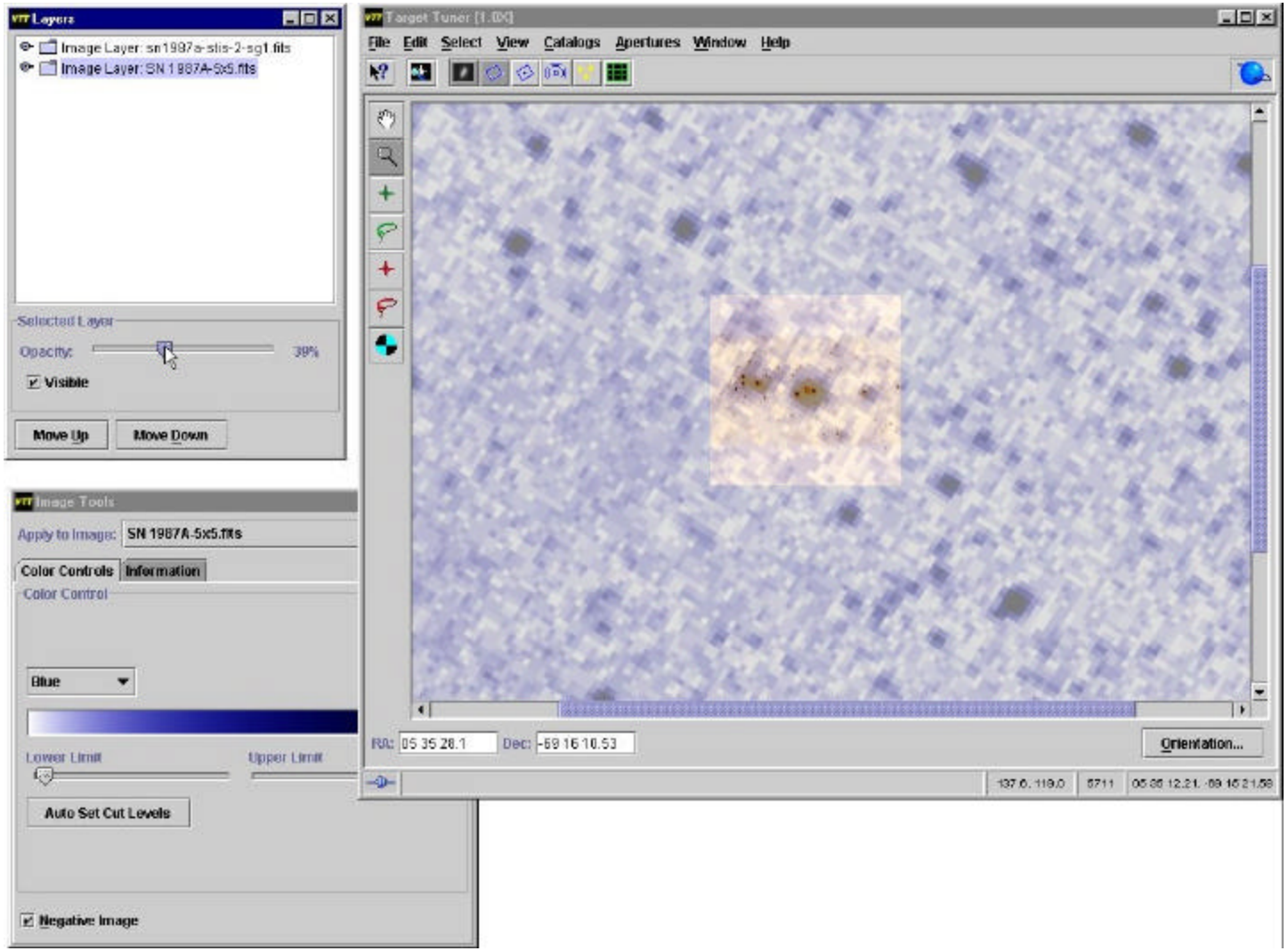
Multiple Images Example
4: Zoom in, DSS overs STIS image



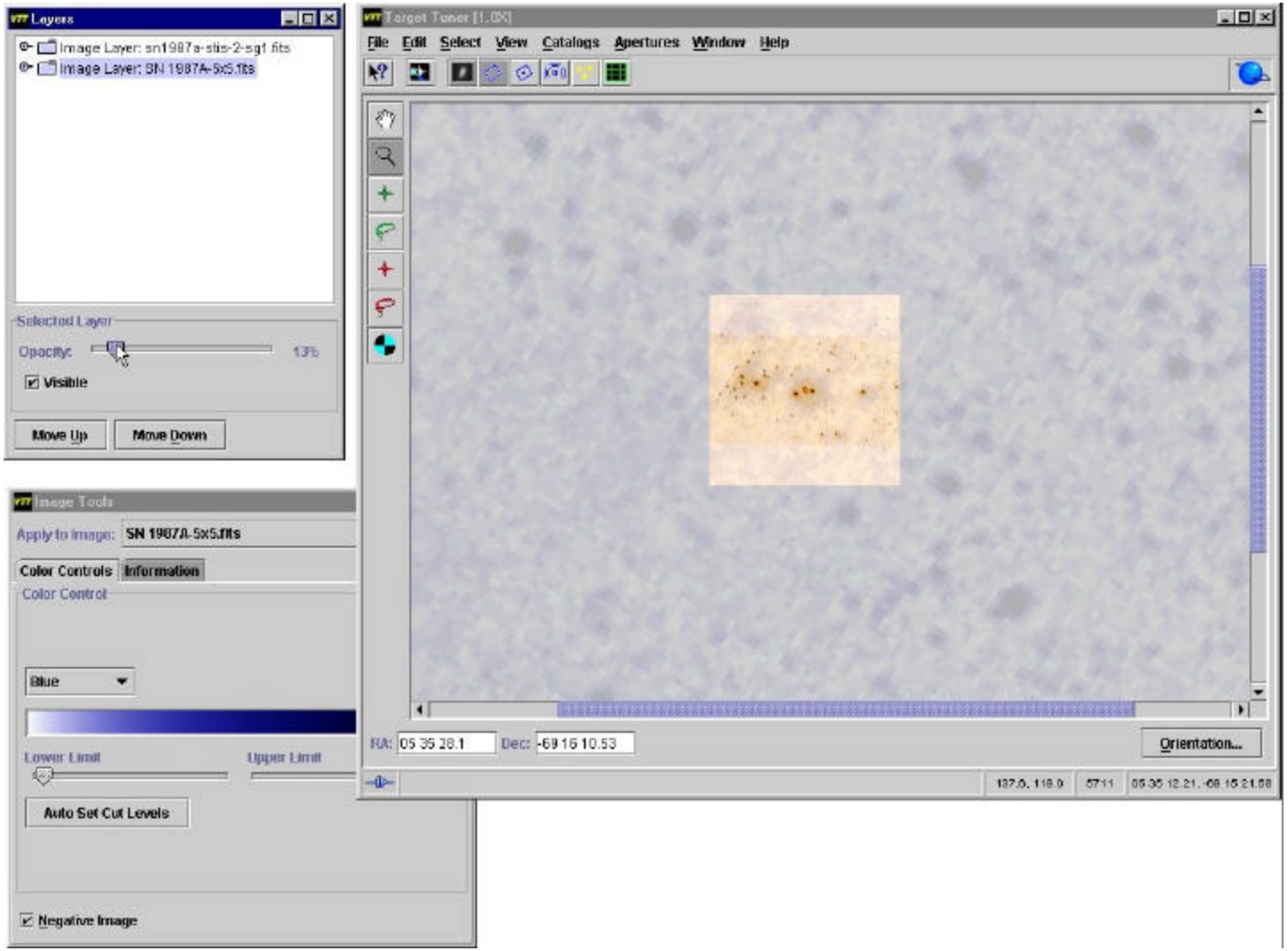
Multiple Images Example
5: Set DDS Color and Contrast



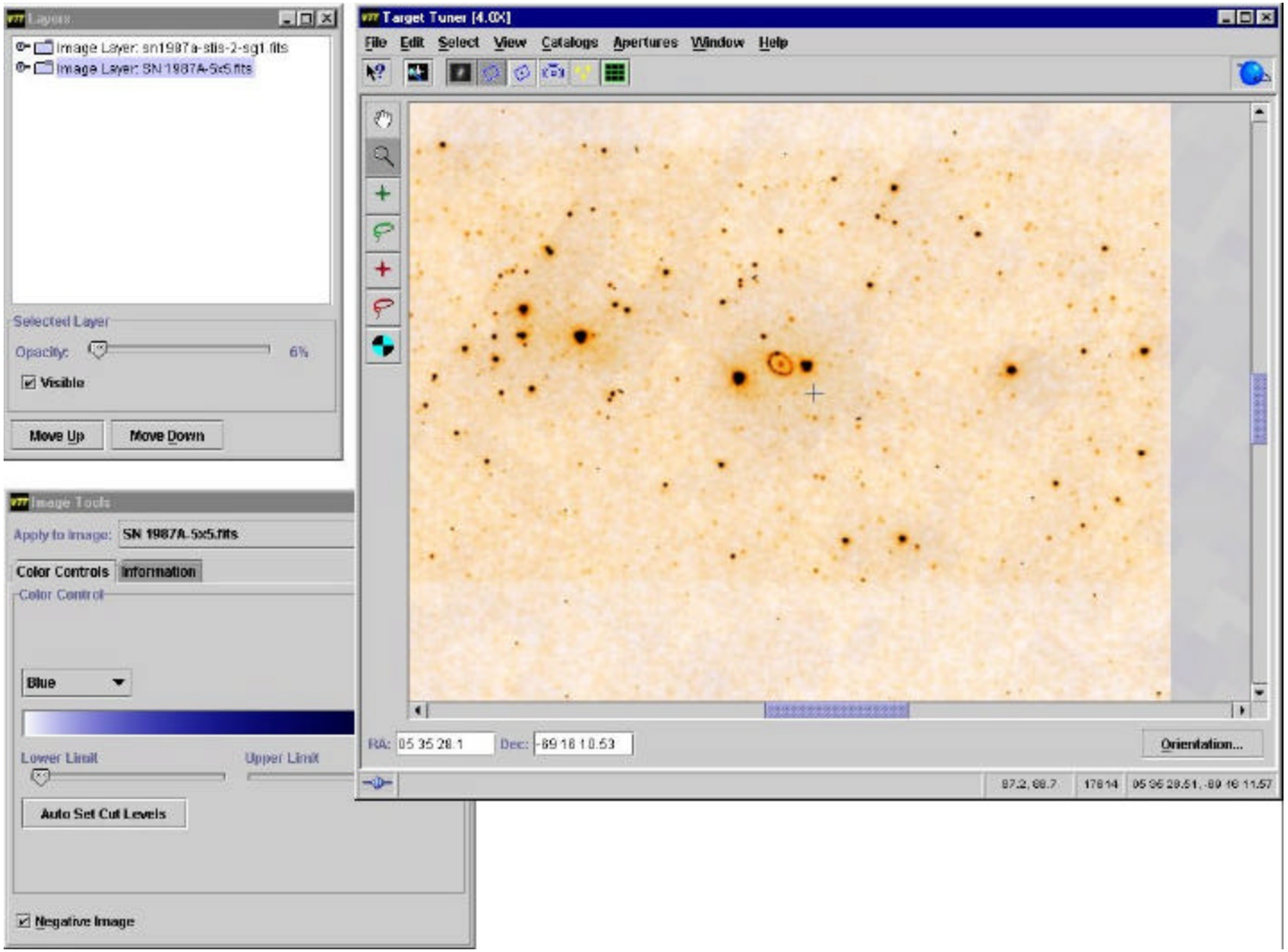
Multiple Images Example
6: Lower Opacity to Blend Images



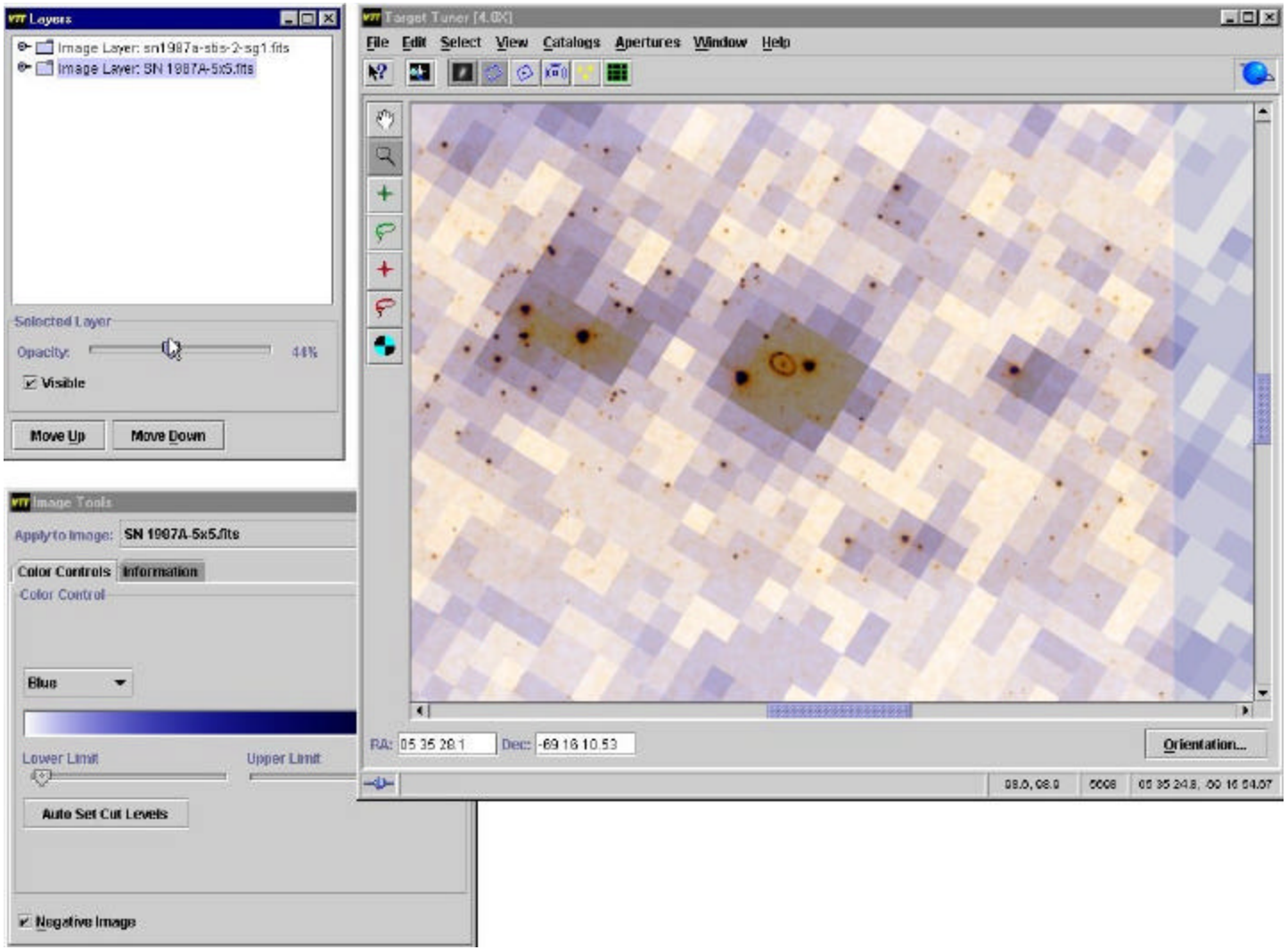
Multiple Images Example
7: Lower Opacity Further



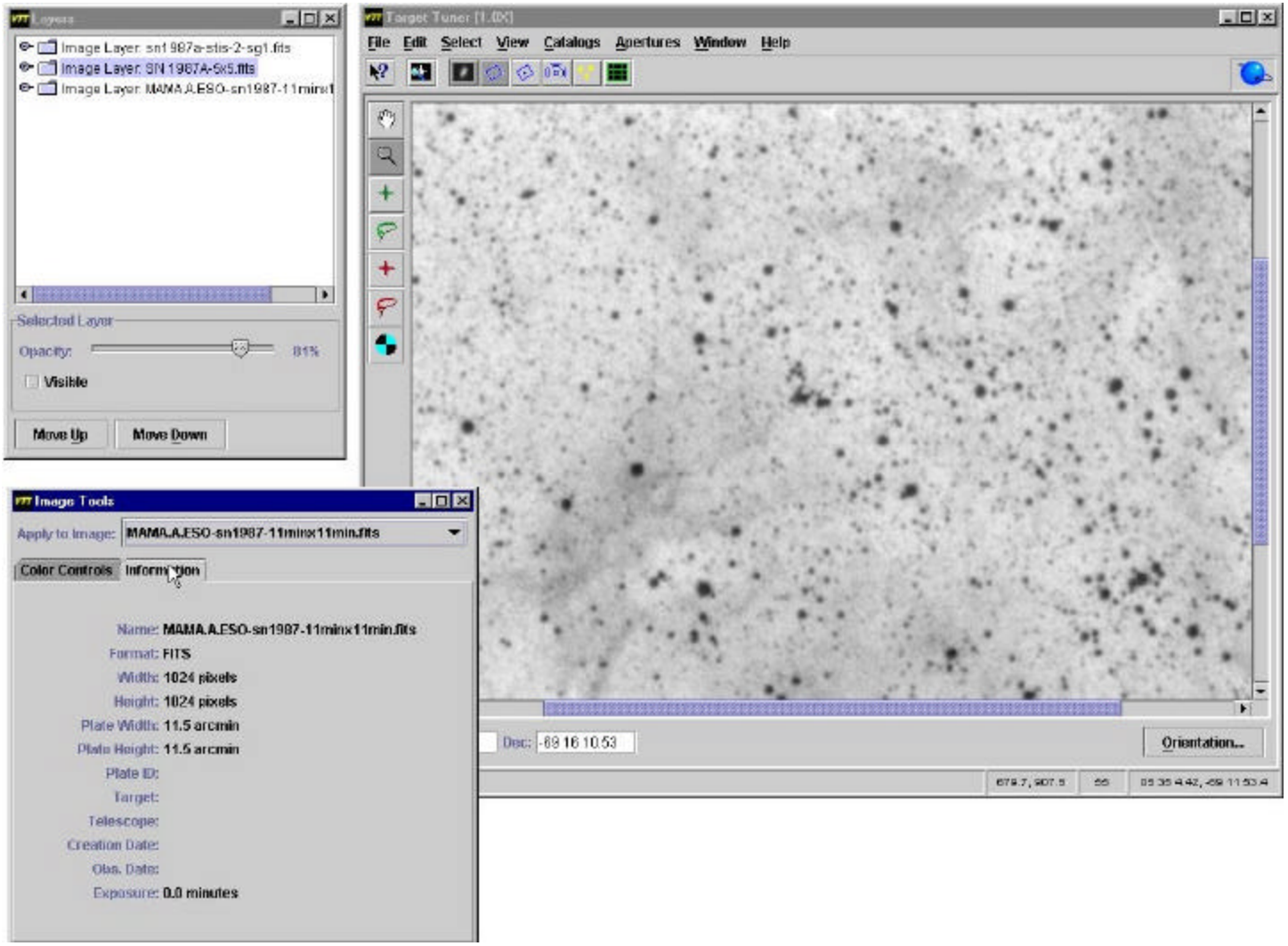
Multiple Images Example
8: Zoom in tighter on STIS image



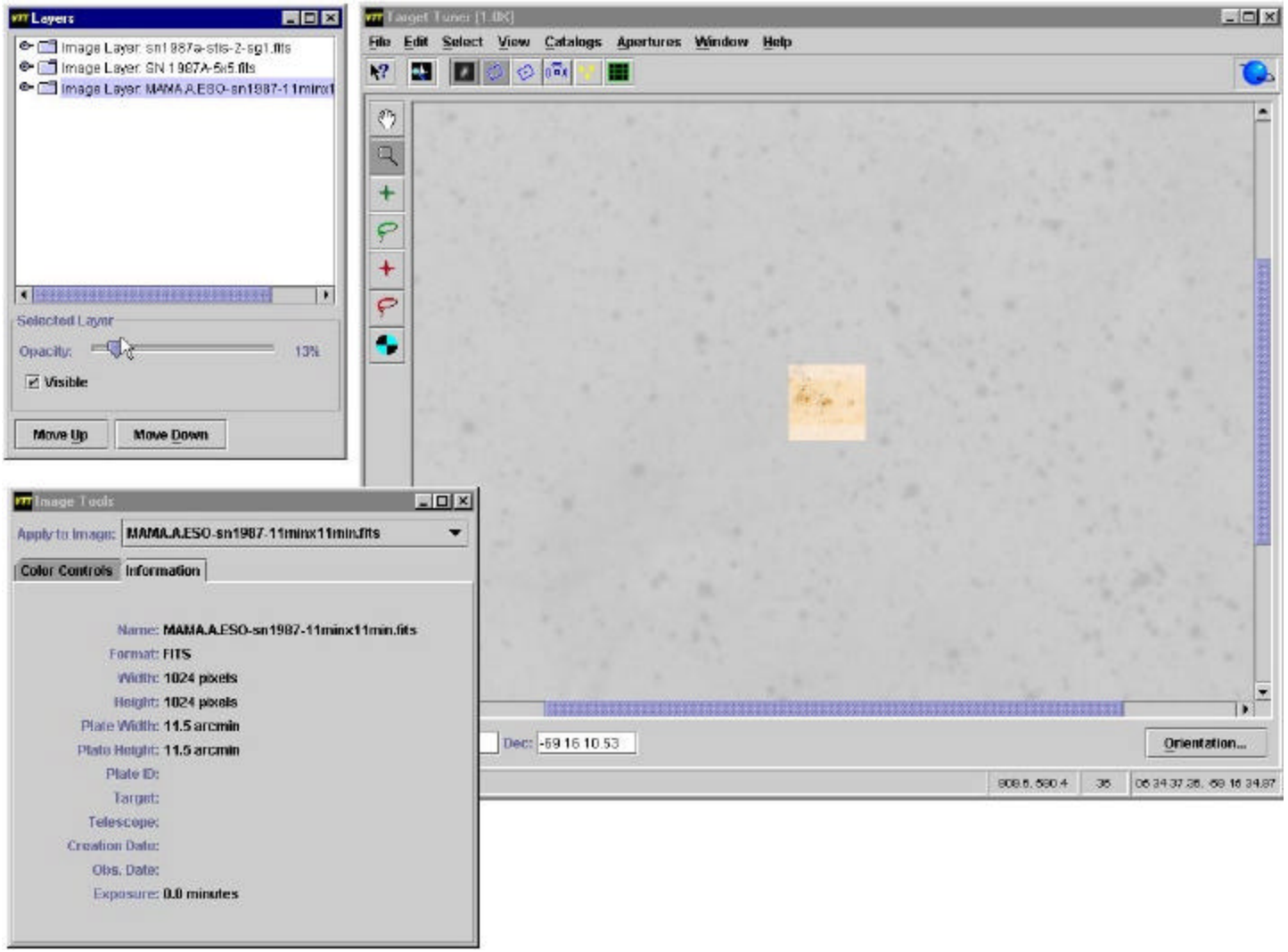
Multiple Images Example
9: Zoom back out, placement good



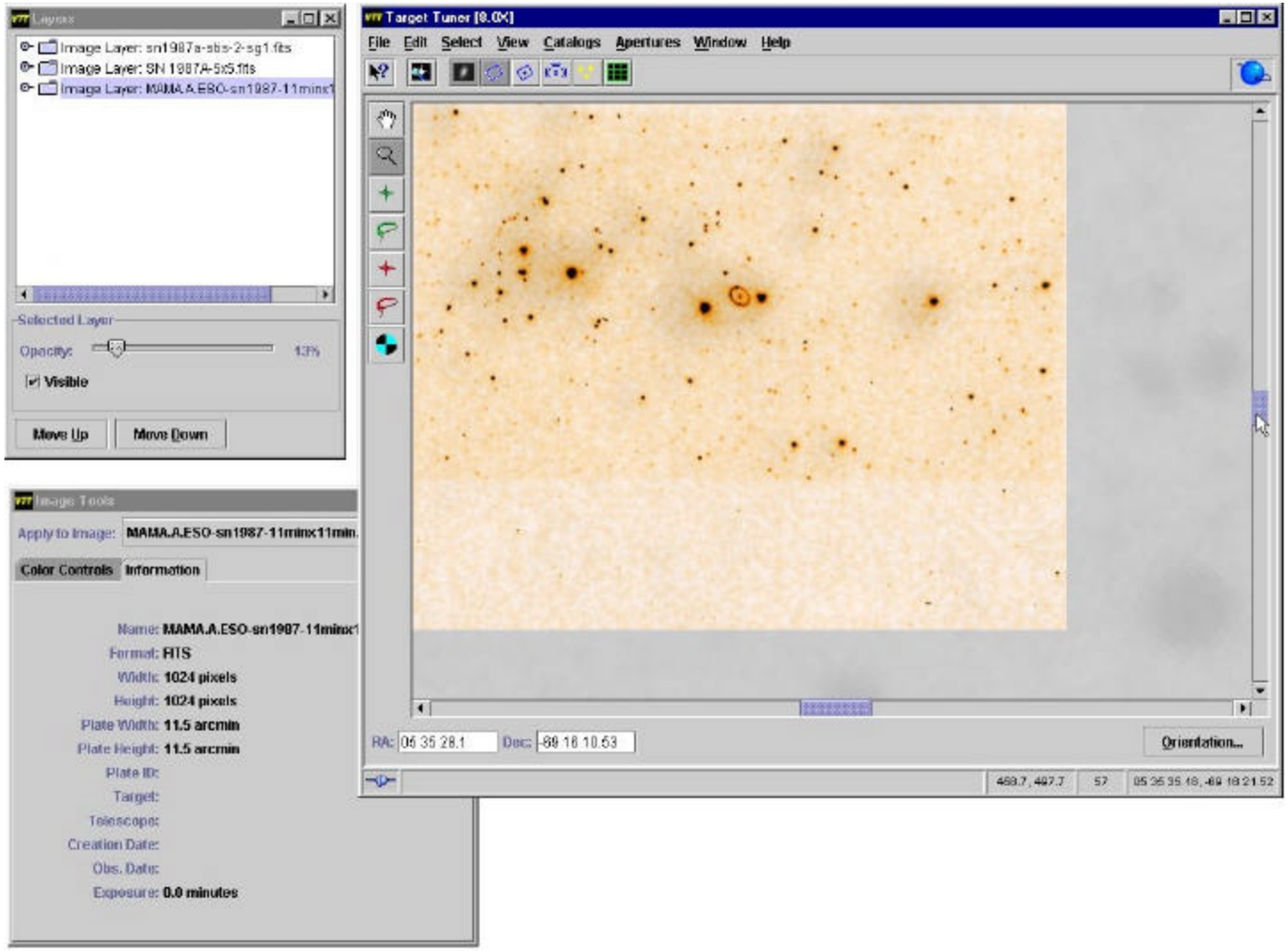
Multiple Images Example
10: Add third image from ESO



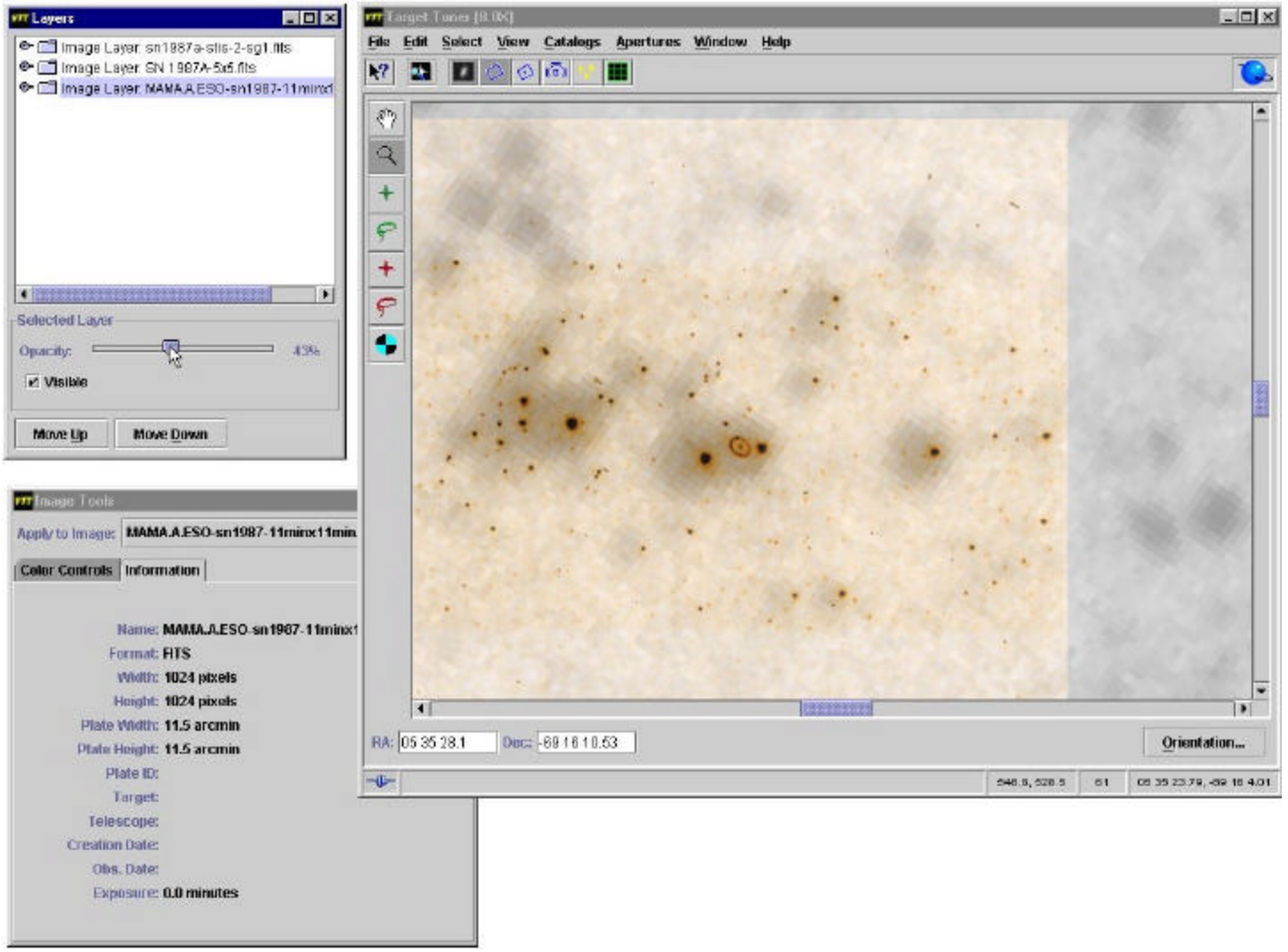
Multiple Images Example
11: Drop opacity way down



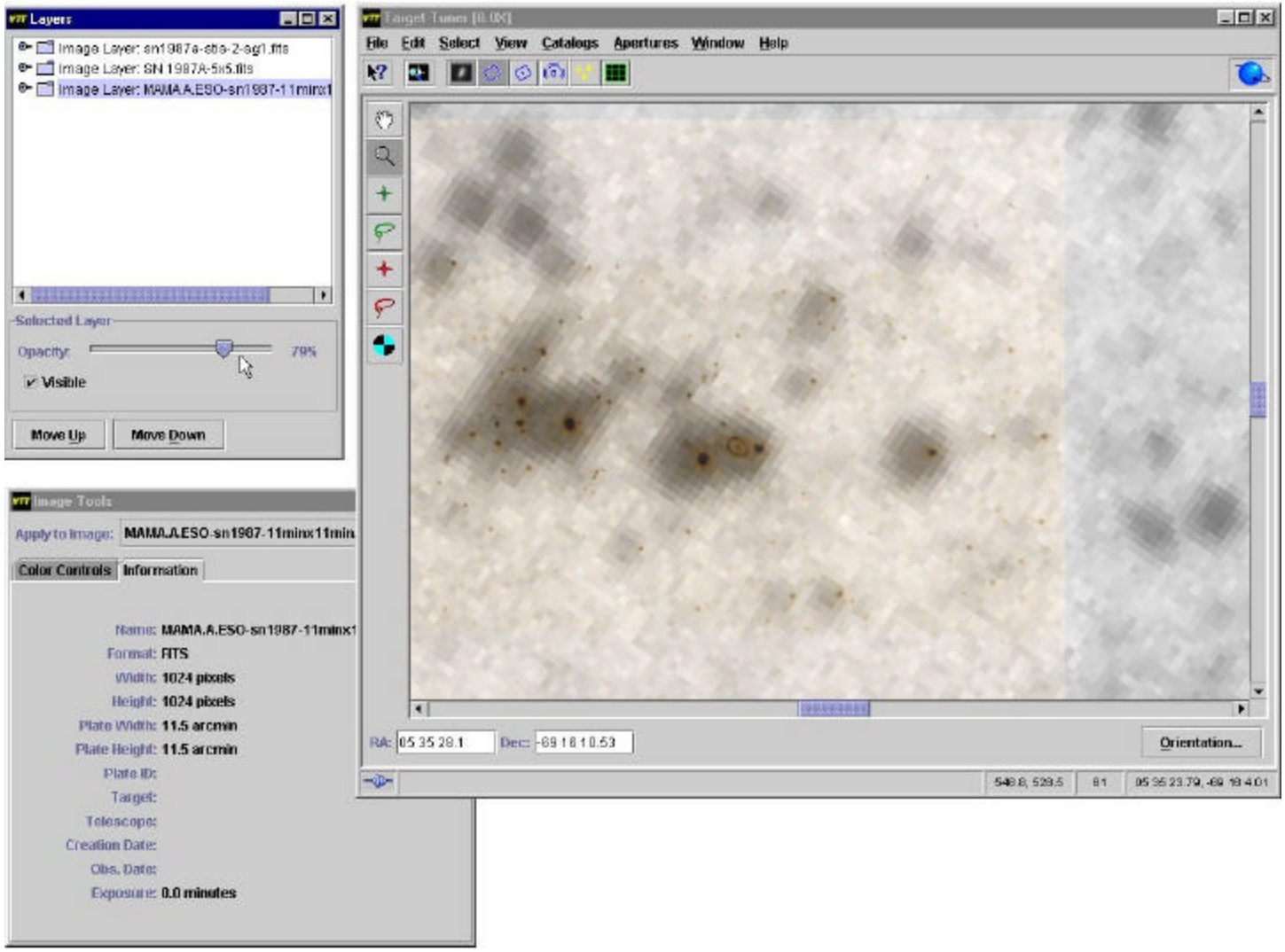
Multiple Images Example
12: Zoom in to show ring again



Multiple Images Example
13: Change opacity …



Multiple Images Example
14: more yet, note slight offset



Lessons Learned So Far (especially for NVO)

- Demo early, demo often
  - Quick early feedback is invaluable
- Promote true teamwork between CS and astronomers
  - Look for an Alpha User- scientist that is an integral member of the project team
- Visual interactive tools are here to stay
- Like R&D into instruments, R&D into tools is vital
- Don't give up on collaborations
  - Software capabilities make true reuse *feasible*
  - Software budgets make reuse *essential*
  - "Face time" is important, leverage conference time/travel

What is SEA Simulation Facility (SSF)?

- Breakdown observation into elements of the light path
  - Standard, simple interface to encapsulate underlying models
  - Interfaces are model/platform/observatory independent
- Pipeline style GUI to allow easy manipulation
  - Edit component properties, place visualization modules anywhere, swap components
- Visualizations installed anywhere in the pipeline

Why a Simulation Facility ?

- For Observers - to effectively determine how various parameters affect their data and their scientific objectives.
  - “Phase 0” tools for initial “framing” of observations
  - Validate proposed observations ahead of time
  - New complex instruments driving need for newer visualization tools
- For Observatory Staff - to characterize and understand the telescope/ instrument/ detectors.
  - Better analysis of instruments with fewer calibrations
- For the Archive User - to understand the quality and limitations of an archival image.

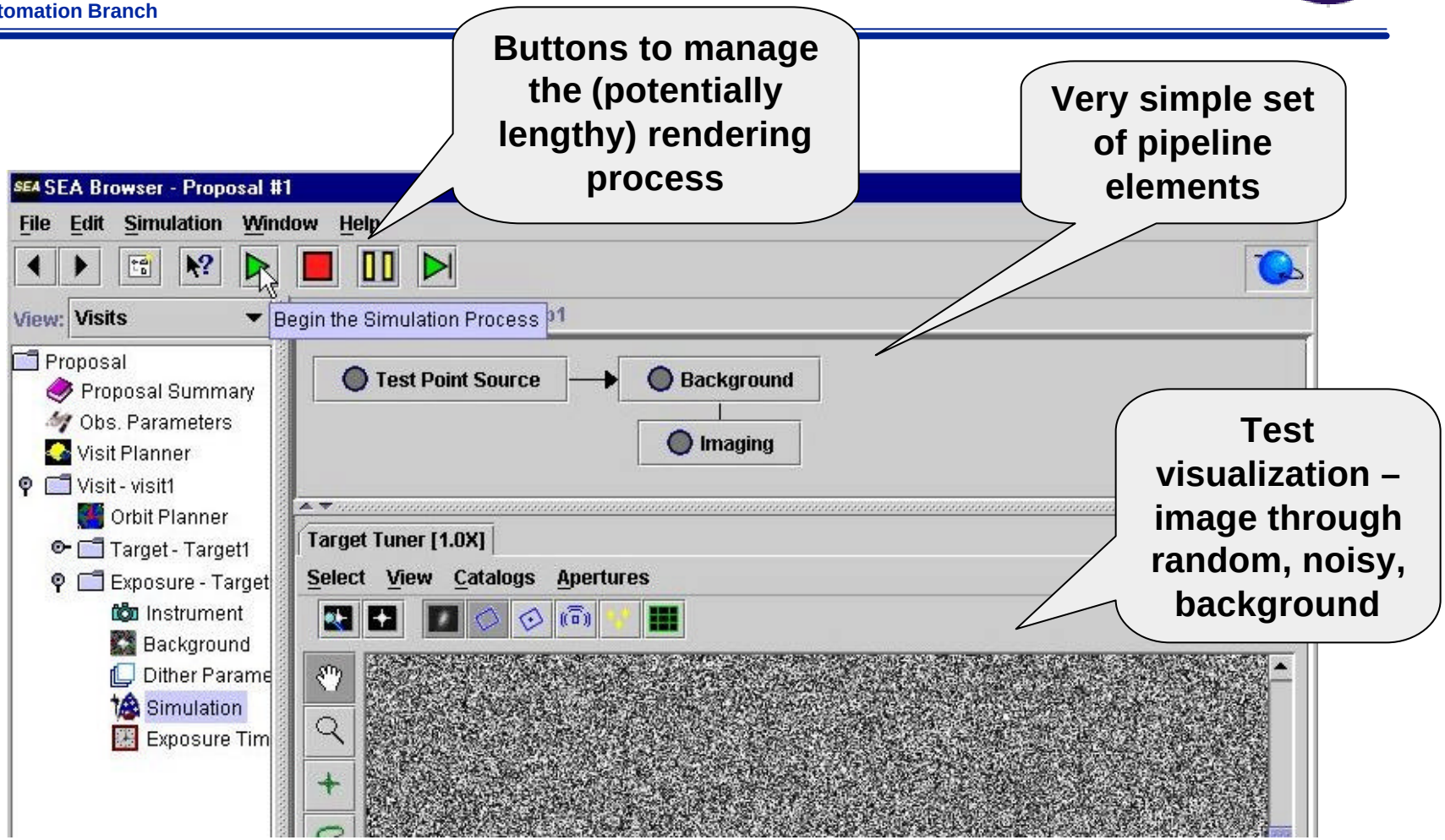
SSF Design Objectives

- Test interactive and innovative ways to look at a proposed observation
- Scalable - In the back-end models and in the front-end views
- Layer the complexity - simple on top, with access to “gory details”
- Pluggable, generic programming interface
  - Non-observatory specific
  - Multi-platform
  - Distributed if needed/desired
- Compatible with early SEA versions
  - R&D successes should benefit all users, failures penalize none

Current Status of SSF

- Initial design / architecture done
- Now implementing first build
- Starting to work with ESO
  - ESO has existing library of simulation models
  - SEA has strength/expertise in visualization software

SSF Interface – Early Preview

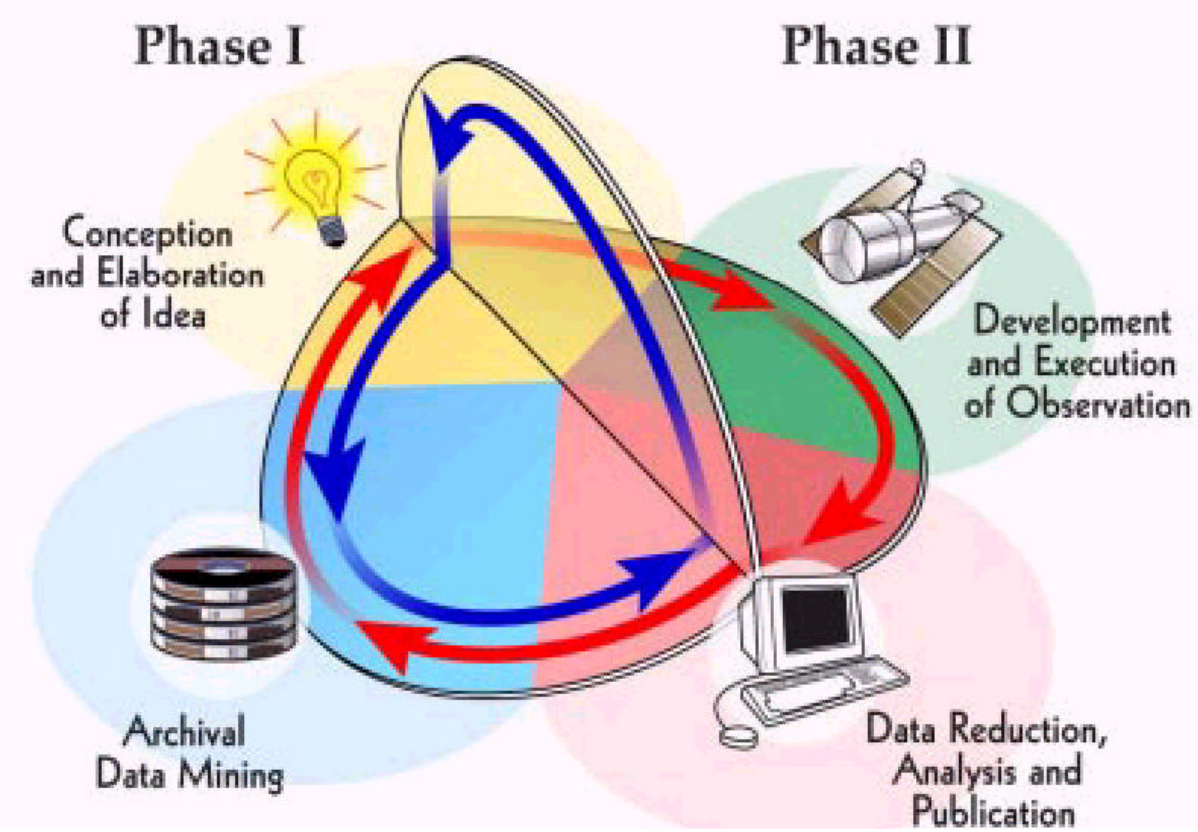


Coming in Next 18 Months

- Complete pipeline GUI for manipulating pipeline elements
- Complete “generic” programming interface for pipeline elements
- Develop interfaces/models for several astronomical and instrument/detector models
- Prototype visualization approaches
  - Emphasis on user interactivity
  - Trials with 3D imaging and layering
  - Fully expect that some will bomb, others will succeed

Observing Needs to Become an Integrated Full Circle

- Ideas to Observations to Archives to Ideas



- Further information: http://aaaprod.gsfc.nasa.gov/SEA